DOCUMENT RESUME

ED 352 403 TM 019 319

AUTHOR Cooley, William W.; And Others
TITLE Educational Indicators for Pennsylvania. Pennsylvania Educational Policy Studies.
INSTITUTION Pittsburgh Univ., Pa. Learning Research and Development Center.; Pittsburgh Univ., Pa. School of Education.
PUB DATE 19 Oct 92
NOTE 36p.; Policy Paper Number 14 in the Pennsylvania Educational Policy Studies Series.
PUB TYPE Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Classification; Data Analysis; *Databases; *Educational Change; Educational Planning; Elementary Secondary Education; *Information Systems; Matrices; Models; Policy Formation; *School Districts; *State Programs; Systems Development; Trend Analysis
IDENTIFIERS *Educational Indicators; Educational Information; *Pennsylvania

ABSTRACT

A state educational indicator system being developed by the Pennsylvania Educational Policy Studies (PEPS) project at the University of Pittsburgh (Pennsylvania) is described. The extensive database that has been established as part of the PEPS project includes thousands of variables that are descriptive of the 500 Pennsylvania school districts. An indicator is defined as a numerical description of some important aspect of the educational system. Indicators will be joined in indicator systems according to models that facilitate analysis of the relationships existing among the indicators. A taxonomy of the types of indicators that are being developed serves as an initial organizing matrix, with three rows representing inputs, processes, and outcomes, and columns representing concerns for equity, quality, and efficiency. Some sample indicators for these concerns are discussed, with examples of the kinds of data that indicators encompass. From the indicators, models are derived that explain aspects of the educational system. Indicators will be useful in understanding the current educational system and how it is changing. This information will be useful for planning and for educating the public about the schools. Reader input is invited to help identify other indicators and to understand what valid inferences can be made from the indicators. Twenty-three figures and one table illustrate the indicators and models. (SLD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED352403

Pennsylvania Educational Policy Studies

PEPS is a joint effort of the U. of Pittsburgh's School of Education and the Learning Research and Development Center
This is policy paper number 14 in this series

Educational Indicators for Pennsylvania

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

by

William W. Cooley, Director
Carole A. George, Research Associate

Graduate Student Researchers:
Ian Beckford
Astrid Hendricks
Ann-Maureen Pliska
Debra Pomponio

University of Pittsburgh

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
K. MALOY
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

October 19, 1992

The purpose of this series of papers is to contribute to a more informed debate about critical policy issues facing Pennsylvania's public schools. This PEPS series draws upon a data base that has been established here at the University of Pittsburgh under the direction of William Cooley in cooperation with the Pennsylvania Department of Education.

Reactions can be shared:

by mail: LRDC, Pgh.,PA 15260
by PittVAX: COOLEY
by FAX: 412-624-7088
by phone: 412-624-7085
by INTERNET: COOLEY@VMS.CIS.PITT.EDU
by chat: room 743, LRDC

TM019319

 BEST COPY AVAILABLE

Forward

This indicator work is a joint effort of the staff of the PEPS project. It began last spring (April 1992), and we expect it will continue as long as Pennsylvania policy makers, educators and the general public find the results to be of interest. The contributors to this report are listed on the cover.

It is important to note that the PEPS database, which makes this exploration of indicators possible, has been developed with the splendid cooperation of the Pennsylvania Department of Education. Our procedures and agreements have been designed to protect individuals from invasion of privacy. No individual records include identifying information. The purpose of the database is to be useful in working toward a better system of public education in Pennsylvania.

In this report we have chosen not to name the districts that are high or low on the various indicators. However, it is possible for districts to locate themselves on most of these indicators, since it involves data that are readily available within each district. We believe that this would be an excellent use of this system of indicators. Eventually it might be desirable to include district names in an indicator report, but it seems premature to do so at this time, and is not in the spirit of this current, exploratory work. We have much to learn about why some districts have extreme values on most of these indicators.

This initial report on this indicator work is being distributed at this time to three primary audiences: state policy makers, district administrators, and researchers in the indicator field. It is difficult to write a single document that might be of interest to all three groups, but we thought it worth the effort because we want very much to get feedback from them as to how to improve this effort.

William W. Cooley
Professor of Education
Learning Research and Development Center
University of Pittsburgh
October 22, 1992

Educational Indicators for Pennsylvania

Efforts to improve the system of public education in Pennsylvania would be greatly facilitated if a broad set of educational indicators were available, providing useful information about the state of the system, how the various components of the system interact, and how they change over time. This paper describes an indicator system that is being developed by the Pennsylvania Educational Policy Studies (PEPS) project at the University of Pittsburgh. This "progress report" is being shared at this time in order to solicit suggestions from Pennsylvania policy makers and action groups, as well as other researchers working on educational indicators.

This PEPS project presumes that when educational reform is enlightened by valid and reliable information about the state of the educational system, reform is more likely to produce the changes that are needed to improve the system than when it is not so enlightened. We realize that educational policy is heavily influenced by political and economic forces, but we aspire to have the information that the PEPS project produces be useful in the Pennsylvania educational policy context. We share Berliner's (1992) concern that educational reform is too often being influenced by disinformation. We believe that we can design and develop an indicator system that can contribute to more reflective policy making, or as Darling-Hammond (1992) put it, indicators that are illuminators of educational activities and processes.

Unfortunately, most of the recent literature on educational indicators has focused upon national efforts, stimulated in part by the interest and controversy

that was produced by the U.S. Education Department's (under Secretary Bell) famous Wall Chart, first introduced in 1984. This national emphasis upon indicator systems is unfortunate for several reasons: education is primarily a state and local responsibility; there is very little comparable educational data available at the federal level; and there is very little that can be done at the national level to deal with any undesirable indications. Within states, thousands of variables are collected each year, and the resulting data are usually comparable from district to district, and from year to year. This provides an excellent opportunity to examine which educational indicators are most useful, and to try to understand their interrelationships, and do so at relatively low cost.

Another conviction which is guiding this indicator development effort is that indicator systems for use within states should emphasize looking at the data at the state and district level, as opposed to the individual school level. The state has the right and responsibility to make sure that all districts in the state are functioning at acceptable levels – fiscally, administratively and educationally, while districts are responsible for ensuring that all of their schools are functioning well. A state indicator system can help districts by showing what can be learned about school differences from the indicators, but it is the district's responsibility to intervene at the school level, not the state's. This indicator system is being developed from that perspective.

Indicators and Indicator Systems

Indicators. The extensive database that has been established as part of the PEPS project includes thousands of variables that are descriptive of the 500 operating school districts in Pennsylvania. Criteria are needed for determining whether a variable or a statistic that is derived from one or more variables would represent a useful educational indicator.

For the purposes of this project we have defined an indicator to be a numerical description of some important aspect of the educational system. We agree with Jaeger's (1978) earlier assessment about the confused nature of indicator definitions and the importance of deducing a definition once convincingly useful indicators actually exist.

We have begun with the following six criteria as we have considered what variables or derived statistics would be worthy of consideration as an indicator:

1) The indicator must be comparable over time. An important function of indicators is to assess progress toward goals, or to establish which aspects of the educational system are getting better or worse. The indicator must be measured in the same way over time so that the longitudinal trend is meaningful.

2) The indicator must relate to some important aspect of the educational system. This "importance" is derived from what is known (or hypothesized) about how the system works and what it is supposed to accomplish.

3) The indicators as a set should reflect current policy goals of the political system, but they must be more inclusive than that if we are to improve our

understanding of how indicators interact, and if the indicators are to be useful over time as policy goals change.

4) The indicators should be derived from data already being collected, particularly until it has been clearly demonstrated that indicator systems can indeed contribute to improving educational systems. Once their value has been clearly established it may be possible to be more ambitious with respect to the cost of such systems.

5) It must be possible to disaggregate the indicator, which means examine how it is distributed throughout the state, so that the highs and lows can be established as a guide to corrective action.

6) The set of indicators must include aspects of the educational system that can be manipulated by policy or programs, but must include other aspects of the system that are "given" if we are to improve our understanding of the dynamics of the system.

Indicator Systems. It is certainly clear that a single indicator is not sufficient to describe the condition of something as complex as the state's educational system. Indicators are needed that systematically cover the major aspects of the educational system. Such a set of indicators then becomes a system of indicators when we begin to understand how the various indicators interact with and influence each other.

Such understanding requires that this work be guided by theoretical models of the educational system which facilitate analyses of the relationships that exist among the indicators. The development of such models is part of what we are doing in this indicator project.

Table 1

A Taxonomy of Indicators
(with one example of each)

	INEQUITY	QUALITY	EFFICIENCY
INPUTS	Variation in expend/pupil	Expend/pupil	% Budget for instruction
PROCESSES	Racial isolation	Pupils per teacher	Avg. daily attendance
OUTCOMES	Achievement gap	Grade 5 literacy	Graduation rate

Table 1 is not that model, but it does provide a taxonomic structure for the types of indicators that are currently being developed. The three rows of the matrix of Table 1 represent three constructs frequently used (e.g., Shavelson, et al. 1989) for indicator systems: **inputs, processes and outcomes**. The three columns represent central concerns about educational systems: **inequity, quality and efficiency**. Within each of the nine cells of the matrix is one example of the different types of indicators that are under development. The cell location of an indicator may be arbitrary until we get a better sense of what it indicates, but some initial organizing scheme is necessary.

This report is organized in terms of the columns of Table 1, since those three constructs reflect the different types of goals that educational reformers tend to have when they set out to improve education. Some reformers want to make schools more efficient, especially from the perspective of the taxpayer;

others want to improve quality, perhaps by raising standards; while others may want a system that is more equitable, with greater educational opportunities for children from very poor homes.

It should be noted that the same raw data can be incorporated into rather different indicators. For example, expenditures per pupil, a frequently used measure of educational inputs, can be viewed as an indicator of the quality of schooling, on the assumption that greater expenditures increase the probability of a higher quality school experience. But if we derive an indicator based upon the degree of variability among school districts in their costs per pupil, then this becomes an indication of the amount of inequity in the system. Efficiency would be indicated by comparing changes in costs per pupil relative to general inflation, given comparable student outcomes. But all interpretations of these indicators depend upon our developing and verifying a strong model of how these indicators interact.

A wide breadth of indicator coverage is also important because policy goals change, political leadership changes, and societal concerns change. Indicator systems would tend to be discarded if they only reflected old concerns, not the current concerns. A comprehensive set of indicators would make that less likely. Let us turn now to descriptions of specific indicators.

Inequity Indicators

Inequity is a good example of a concern that falls in and out of political favor, but must be part of any comprehensive system of educational indicators. For example, the six national goals of the Bush administration are silent on equity issues, but many people remain concerned about the fairness of the

educational system, especially with regard to what has been happening over time. This first pass at our system of indicators includes examples of inequity indicators that deal with educational inputs, processes and outcomes. We refer to these indicators as measures of inequity rather than equity because high values indicate greater inequity, and we always like to name our indicator with that convention.

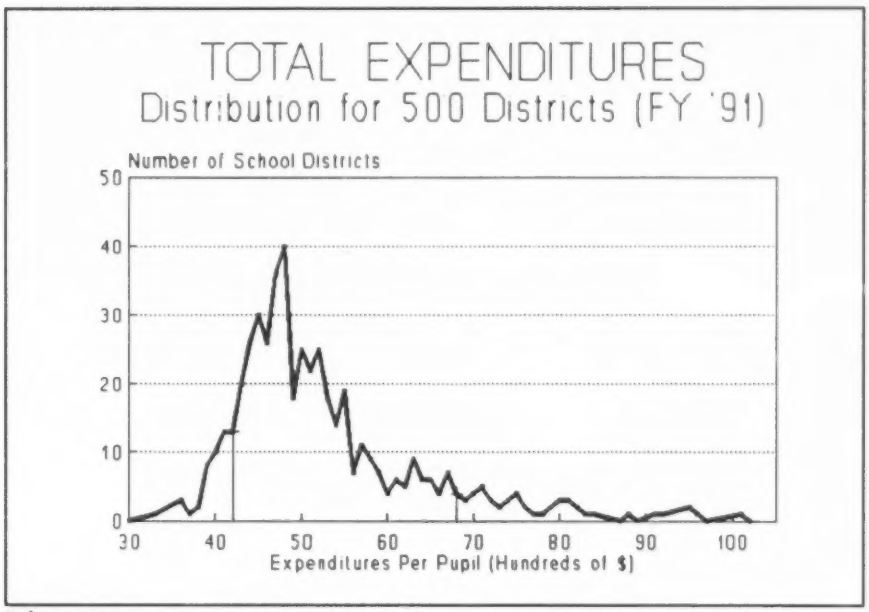

Figure 1

Total Expenditures Per Pupil. Figure 1 shows the distribution of the expenditures per pupil for the 500 school districts for the school year 1990-91 (i.e. 1991 in our notational convention). This graph shows that per pupil spending ranged from less than $3400 in one school district, to a high of $10,200 in another, indicating that one district was spending three times as much as another district (per pupil). This type of disparity has helped to stimulate the many recent lawsuits regarding state funding of public schools,

including the lawsuit in Pennsylvania. It is clear that a higher quality educational experience is more likely when a district spends more than $10,000 per pupil than when it spends less than $4000. Kozol (1991) provides vivid descriptions of the nature of such differences. We are exploring ways of also showing the implications of such disparity in quantitative ways.

Researchers have developed a number of statistical procedures for describing the degree of inequity that is represented in distributions such as the one in Figure 1 (e.g. Harrison, 1976). One procedure that seems to us to be easily interpreted and represents the kind of concerns people have about fairness is the ratio of high spenders to low spenders. In doing so though it is important not to have this ratio depend solely upon the two outlying districts. That could be misleading if one or both of those two districts represented extreme values (as is the high district in Figure 1), and basing a statistic on only two values does not provide a reliable basis for studying the disparity trend over time. Therefore we have chosen to use the point below which 10% of the districts lie, and above which 10% lie. The left vertical bar in Figure 1 indicates the point below which 10% of the districts lie. Those 50 districts were spending less than $4300 per pupil. The right vertical bar (at $6800 per student) marks the point above which the top 50 districts lie.

This ratio (6800/4300 is equal to 1.58, meaning that the richest districts are spending more than one-and-a-half times as much as the poorest 10%. Figure 2 plots those ratios for the past 10 years. That trend line shows that the disparity between rich and poor districts that is evident for 1991 in Figure 1, is not a new phenomena, and has been neither increasing nor decreasing

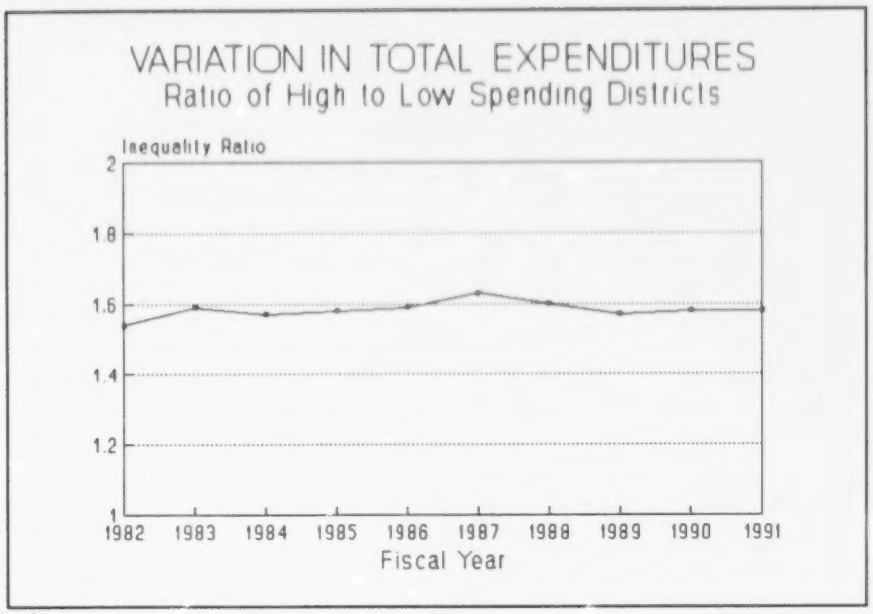

Figure 2

over the past ten years. So although the gap is large, at least it has not been getting worse. (Another inequity measure that we have applied to these same data, the coefficient of variation, provides the same conclusion, but we think that this inequity ratio is more easily interpreted and is closer to how people think about inequities.)

Taxpayer Inequity. While variations in expenditures per pupil indicate possible differences in the quality of educational programs that are available in different school districts, it is also important to notice whether things are equitable for the taxpayer. It may not be considered fair if some taxpayers are being taxed over $30 per $1000 in income to support their schools, while others are paying less than $15 per $1000. We are currently considering several different measures of tax effort, which in general is the amount of local taxes collected relative to the local capacity to pay taxes, where capacity is

some measure of local wealth.

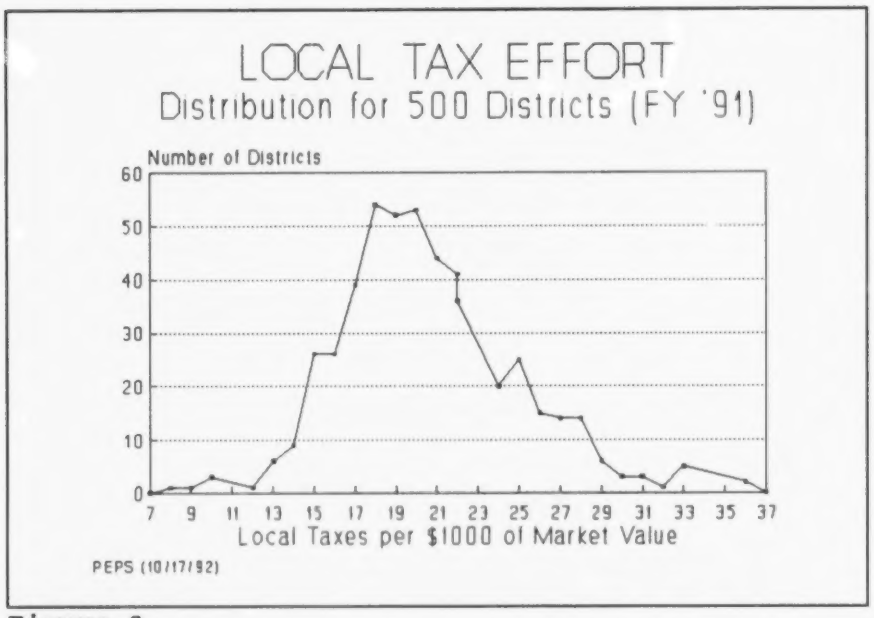

Figure 3

Figure 3 illustrates the usual method of estimating tax effort, which is measuring the amount of total local taxes collected per $1000 of the market value of local property (a form of equalized millage rate). For example, Figure 3 shows that in 1991 there were 54 districts in which the tax effort was $18 per $1000 of property market value, and that was the most common rate. For taxpayers in the district with the lowest tax effort local taxes were less than $8 per $1000 of market value, while two districts it is $36/1000, over four times as much.

Another measure of the degree of inequity that we are trying out in this indicator work is the coefficient of variation (CV), which measures the amount of variation in a distribution relative to its mean, so that CV's are comparable from year to year. If this coefficient increases over time, that indicates that the

disparity between the highs and lows is increasing. (The coefficient of variation (CV) is computed by taking the standard deviation of the Figure 3 distribution and dividing it by the mean, then multiplying by 100 to convert it to a whole number.)

Converting the tax effort distributions to CV's for the past 10 years

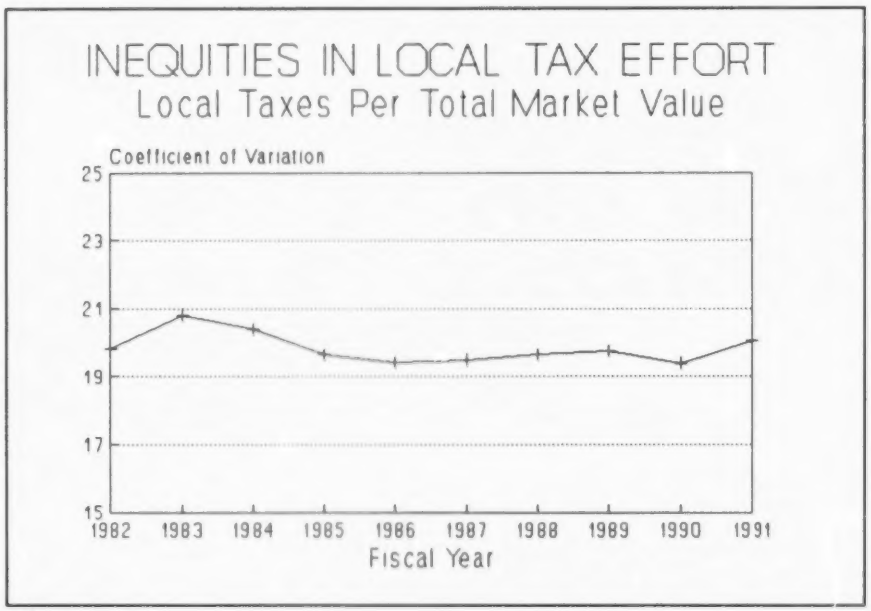

Figure 4

(Figure 4), we see that taxpayer inequity has been rather flat, ranging from a high of 20.79 in 1983 to a low of 19.40 in 1990. That is, while there are large inequities in the size of the tax burden among the 500 school districts, as shown in Figure 3, the degree of inequity has not been tending up or down over time, as shown in Figure 4.

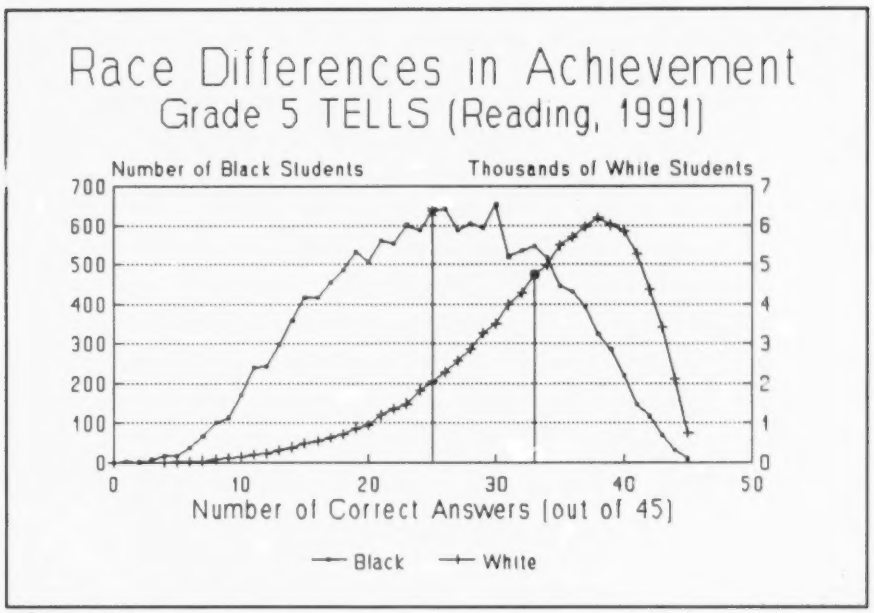

Figure 5

Racial Achievement Gap. The discrepancy in performance between black and white students continues to be of great concern. Figure 5 illustrates the black and white distributions for the spring 1991 grade 5 TELLS (Test of Essential Learning and Literacy Skills) reading scores. For example, there were 652 black students with a score of 30, and 6,192 white students with a score of 38, the most frequent scores for those two groups. The left vertical bar in Figure 5 locates the black mean (25.28), which is eight points below the white mean (33.23, the right vertical bar). In order to obtain a measure of the race discrepancy for the Pennsylvania TELLS results, we developed a descriptive statistic referred to as a "gap score." This gap score is based upon the difference between the statewide mean of the black students and the statewide mean of the white students. That difference is equal to one standard deviation, and we call this a gap score of 10. The higher the gap score, the greater the

discrepancy between the performance of blacks and whites on TELLS.

To put that reading gap score in perspective, 84% of the white students scored higher than did the average black student. Also, the minimum competence cutscore for that reading test was 26, indicating that the black mean (25.28) was just below the cutscore.

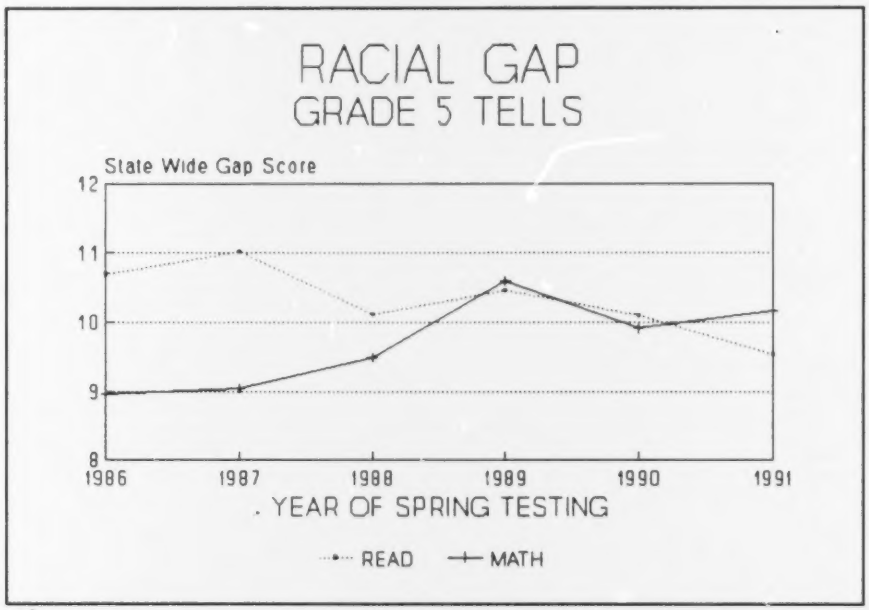

Figure 6

Figure 6 shows the gap score using the grade 5 TELLS data from 1986 to 1991. In the spring of 1986 the gap between the state's white and black fifth graders in reading was more than one standard deviation, producing a gap score of 10.7, as shown in Figure 6. In that year the math gap was substantially less (8.9), and that trend continued into 1987. But in 1988, the reading gap began to narrow and the math gap began to increase, so that in 1991, the last year for which TELLS data are available, the reading gap score was smaller than the math gap, but both were around 10.

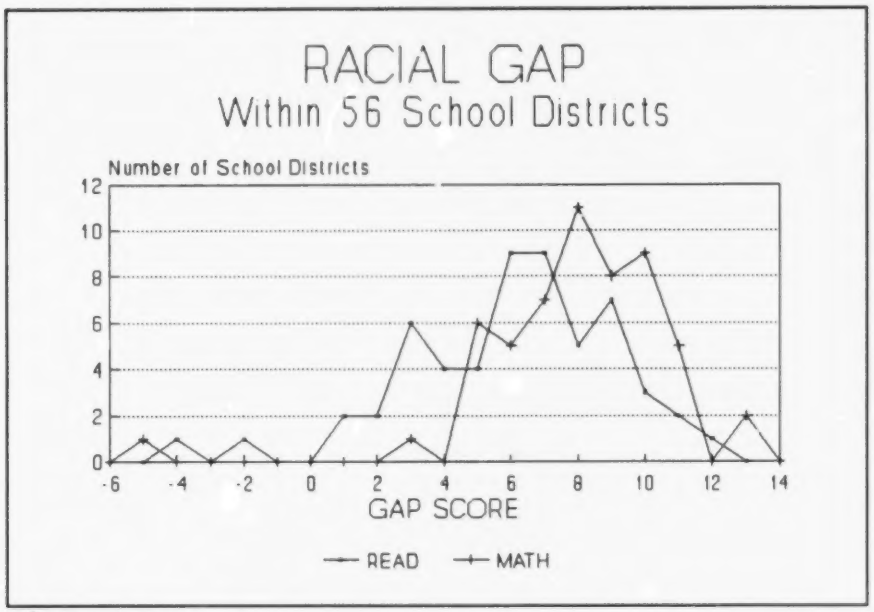

Figure 7

Figure 7 shows the distribution of a gap score computed at the district level for the 56 districts who enrolled at least 30 black students in grade 5 in the spring of 1991. As the graph depicts, most of these districts show that the black students are scoring between one-half to one full standard deviation below the white students (i.e. gap scores between 5 and 10) on both reading and math. But what is significant is the broad range of gap scores that are evident among these 56 districts, with the black students even outperforming the white students on both math and reading in one district. This variation in the gap score may be a function of a number of home and school factors for which these districts differ. Explanations for this wide variation in gap score at the school level are currently under investigation by Beckford (1992).

Quality Indicators

Non-Public School Enrollments. One reason why parents pay tuition to send their child to a non-public school is their dissatisfaction with the public schools. Thus, a rough indication of the perceived quality of the public schools can be obtained from the non-public school participation rates. Figure 8 shows this indicator for the period 1982 to 1991. It can be seen there that since

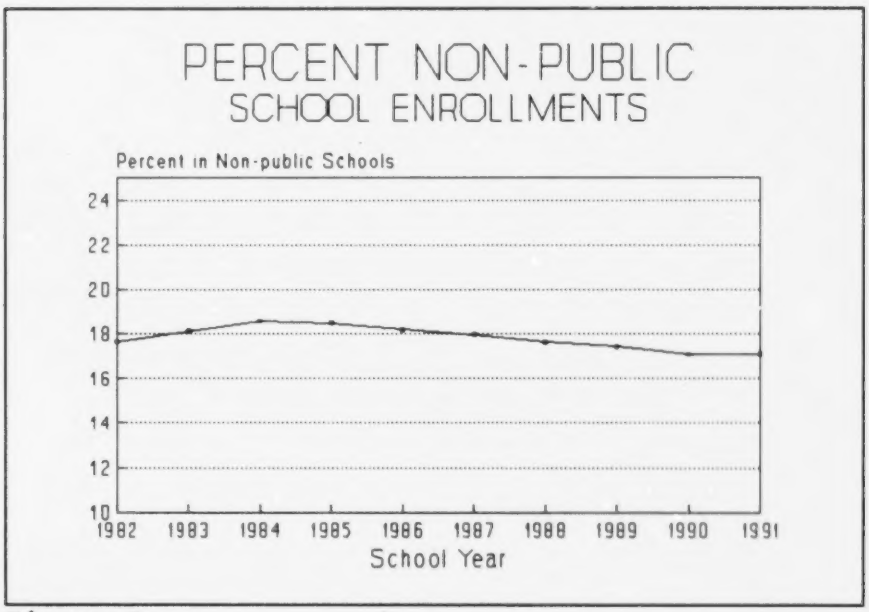

Figure 8

1984 there has been a steady decline in the percent of all K-12 students that are attending non-public schools in the state as a whole. Although this decrease is only 1.47% (from 18.57% in 1987 to 17.1% in 1991), this represents a shift of about 30,000 students from the private to the public schools. Of course this indicator is also a function of factors such as the state of the economy, religious values, the availability of non-public school options,

as well as perceived quality of the public schools. This is one example of the complexity of most indicators and why we need to better understand the dynamics involved in their changes.

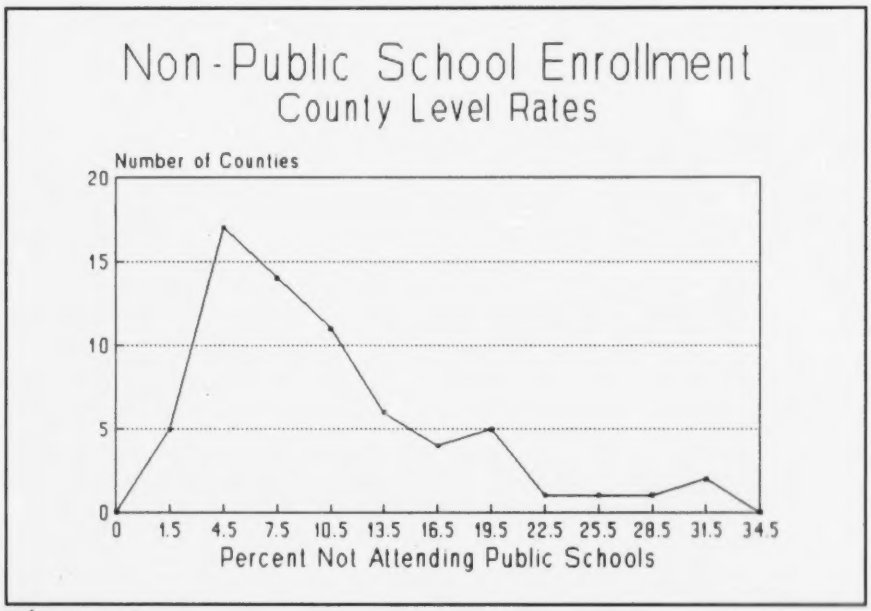

Figure 9

Figure 9 shows how this participation rate varies at the county level. (This distribution cannot be done at the district level because of the way private schools draw students from many districts.) For example, 17 counties had between 3% and 6% of their students attending non-public schools, and in four counties less than 3% did. In two counties almost one-third (between 30 and 33 percent) were attending non-public schools. Understanding this variation among Pennsylvania's 67 counties would be important in establishing the kinds of inferences that can be made about this indicator.

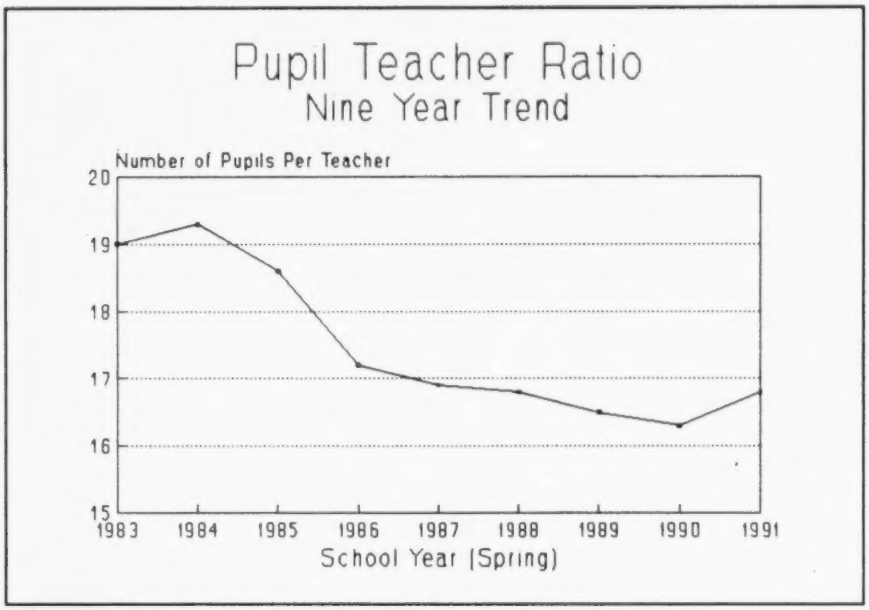

Figure 10

Pupil/Teacher Ratios. Between 1984 and 1990, enrollment in Pennsylvania's public schools dropped from over 1.8 million students to about 1.6 million (11%). At the same time, the number of teachers increased from 94,363 to 99,328 (5%). These two trends resulted in a large decrease in the number of pupils per teacher, as shown in Figure 10. The enrollment decline reflects the changing demographics (reduction in the number of school age children) during that time period, while the increase in the number of teachers is largely a function of the increase in the number of special teachers (e.g., compensatory and special education) which districts hired during that time period.

Although the pupil to teacher ratio is not a direct measure of class size, it is often viewed as another indicator of the quality of the educational experience. That is part because it is more likely that a student would receive

more individual attention with fewer students per teacher than with more. If this assumption is correct, then this indicator suggests that the quality of education has increased since 1984. Although the pupil/teacher ratio clearly affects costs per pupil, the extent to which the variation in pupil/teacher ratio is related to student achievement results is still not clear.

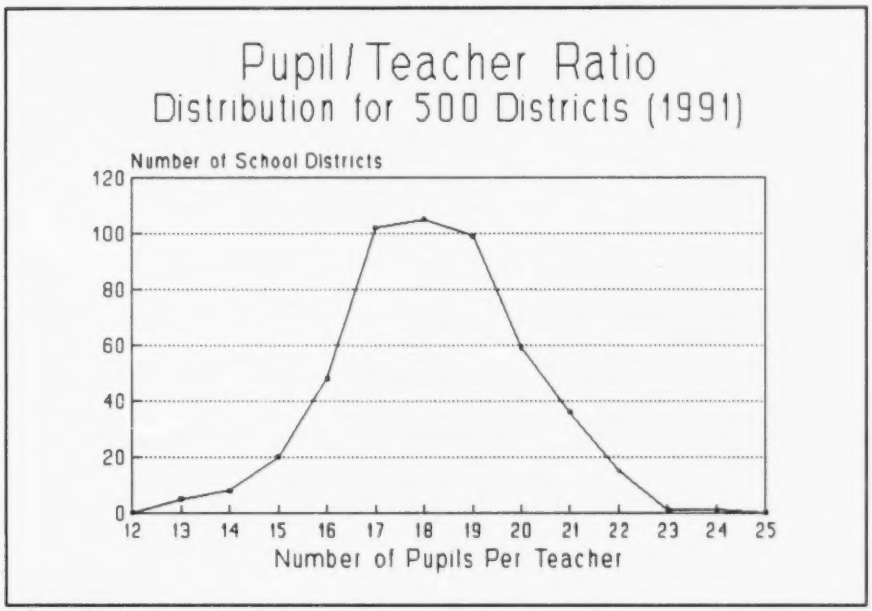

Figure 11

Figure 11 shows the distribution of the pupil/teacher ratios for the 500 districts. The most frequently occurring ratio, with 105 districts, was between 18 and 19 students per teacher. The range is rather dramatic, with five districts having less than 14 students per teacher, while in one district it was as high as 24. These large differences in pupil/teacher ratio is one of the two major reasons for the large differences in per pupil expenditures that was shown in Figure 1 (differences in average teacher salary being the other major reason).

Student Achievement. Of course the obvious and most important quality measure is how well students are achieving in school. Unfortunately, it is more difficult to develop a good indicator of this than most people realize. One difficult problem, for example, is being able to show what has been happening to student achievement levels over time. In Pennsylvania, for example, the TELLS test, which is the only state-wide measure available, has been changed each year, at least enough so that comparisons from year to year are difficult, especially since the equating work that might have made such longitudinal comparisons more meaningful, have not been done.

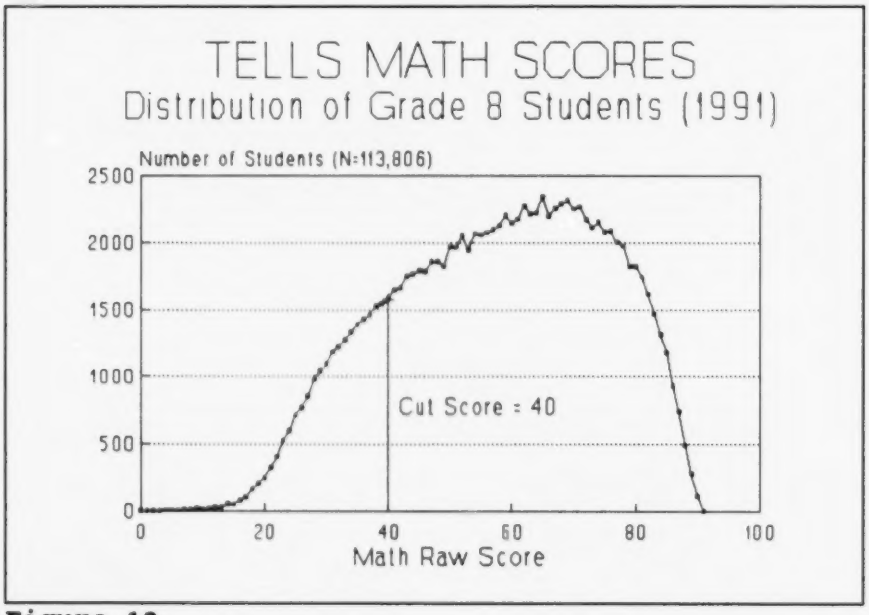

Figure 12

For these and other reasons, we have chosen to limit discussions of student outcomes to the most recent results, and do it in ways that may reveal the current state of student achievement in the basic skills in reading and math. Figure 12 shows the student level distribution for grade 8 math for 1991

TELLS. Of the 113,806 students who took that test, there were 22,243 students (19.54%) who performed below the level considered to be minimum math competence for eighth grade mathematics. These are students who could not perform such common mathematics tasks as interpret tables and graphs, conduct simple measurement tasks, read maps, dials and meters, and perform simple arithmetic involving money or time. Students performing at such a low level in eighth grade would be expected to have great difficulty in high school and in finding subsequent employment.

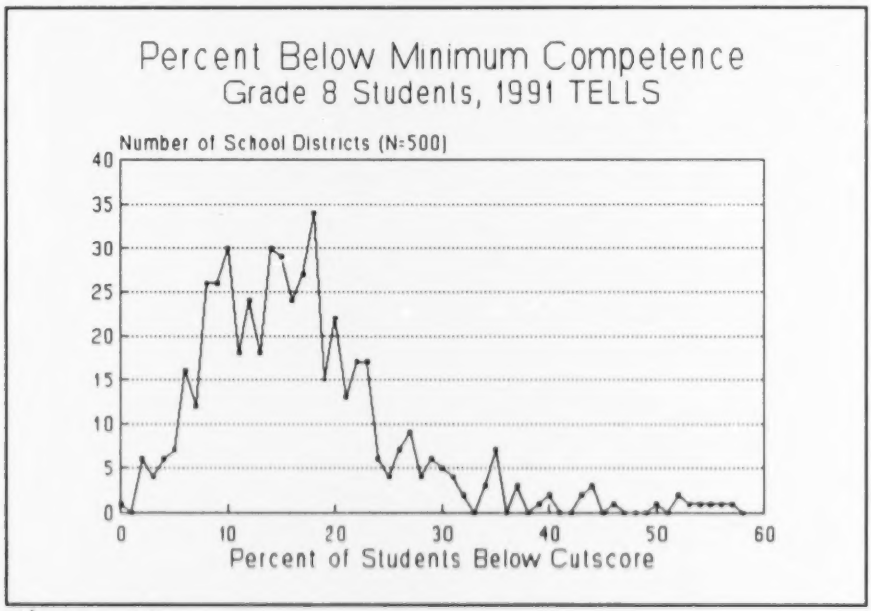

Figure 13

Figure 13 is the district level distribution for the percent of eighth graders that are scoring below 40 on the TELLS math test, which the state considers to be the minimum competence for grade 8 math. For example, in 34 districts 18% of the students scored below that minimum cutscore. What is particularly disconcerting is that there were eight school districts in

Pennsylvania in which more than half of their students scored below the cutscore. On the other side of the distribution, there was one district in which less than one percent scored below the cutscore.

Efficiency Indicators

Instructional Focus. Figure 14 shows the percent of total expenditures that has been spent on instructional programs over the last seven years. The

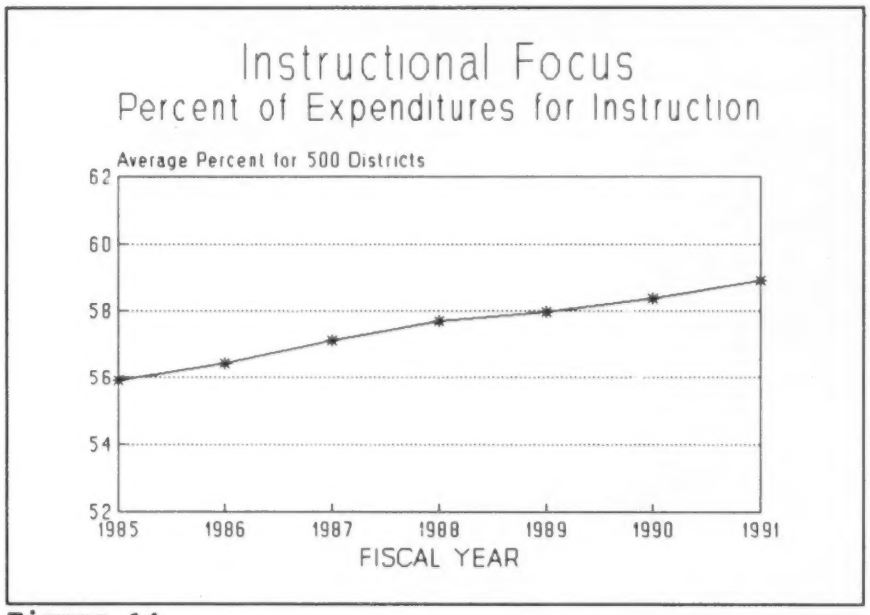

Figure 14

trend line in this graph shows a gradual but steady increase, from 55.5% to 57.3%, in the six year period, indicating that the percentage spent on instruction has increased slightly.

Figure 15 shows the frequency distribution of the instructional expenditures as a percent of total expenditures for the 500 districts. This graph illustrates the percentage of spending for instruction to have a range of

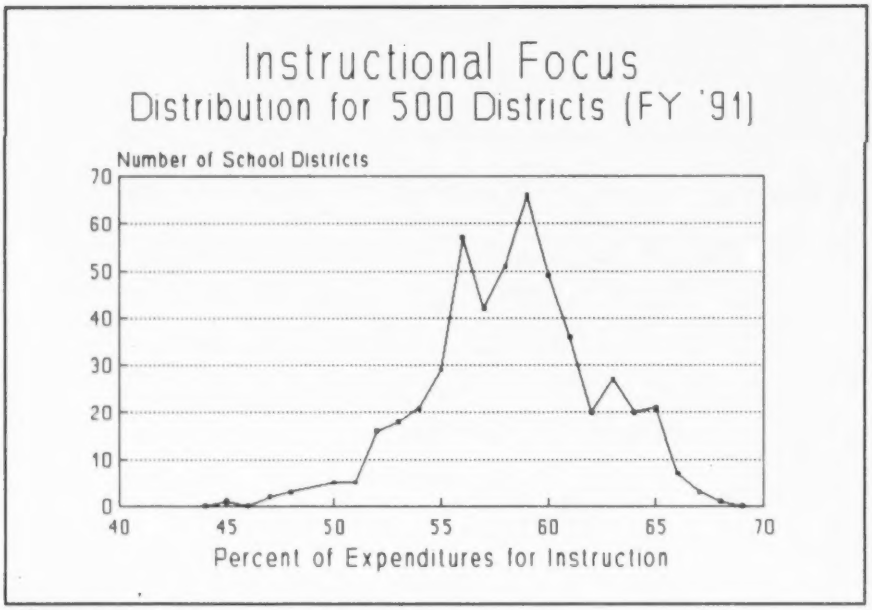

Figure 15

45% to 68%, with eleven districts spending less than 50% of their expenditures on instruction.

Delinquent Taxes. One responsibility of the state is to make sure that all 500 districts are fiscally sound. This and the next indicator, beginning fund balance, are related to this aspect of the educational system. If a district has a high percentage of delinquent local taxes, that could indicate financial difficulties. Figure 16 shows that this tax delinquency rate increased between 1982 to 1987, where it leveled off at about 4.5% for the average district.

Figure 17 shows how this tax delinquency rate is distributed among the 500 districts. For example, in one district, 19% of local taxes were delinquent. Also, there were 22 districts with delinquency rates greater than 10%. The most frequent rate was only 2%, which was the rate for 73 of the districts, as shown in Figure 17.

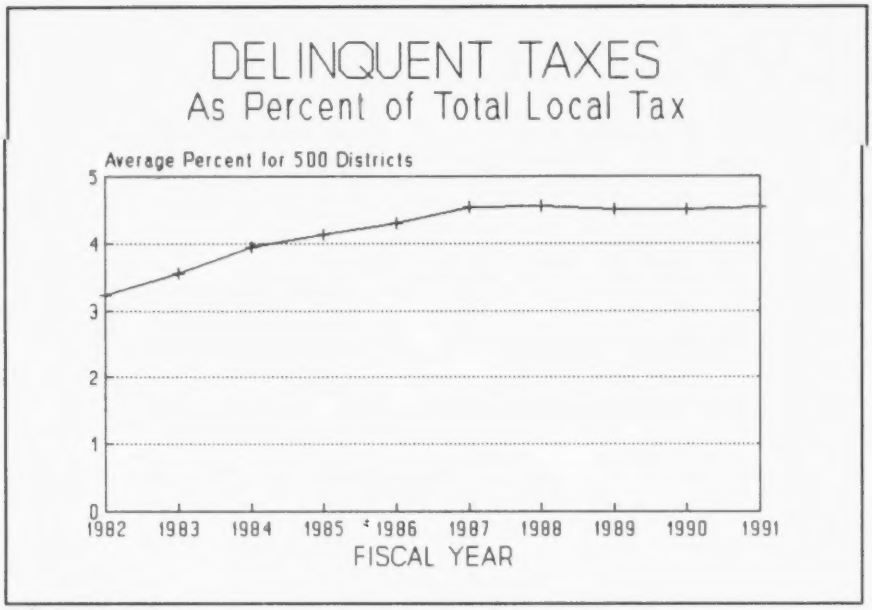

Figure 16

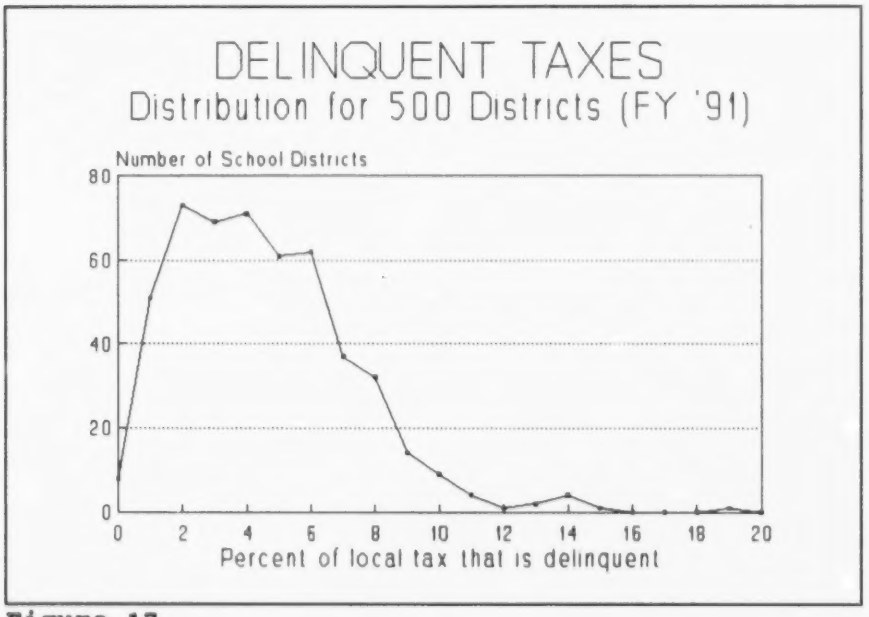

Figure 17

Beginning Fund Balance. If a school district has a negative fund balance at the beginning of a new fiscal year (it spent more the previous year than it received in revenues), that could contribute to the school district's financial

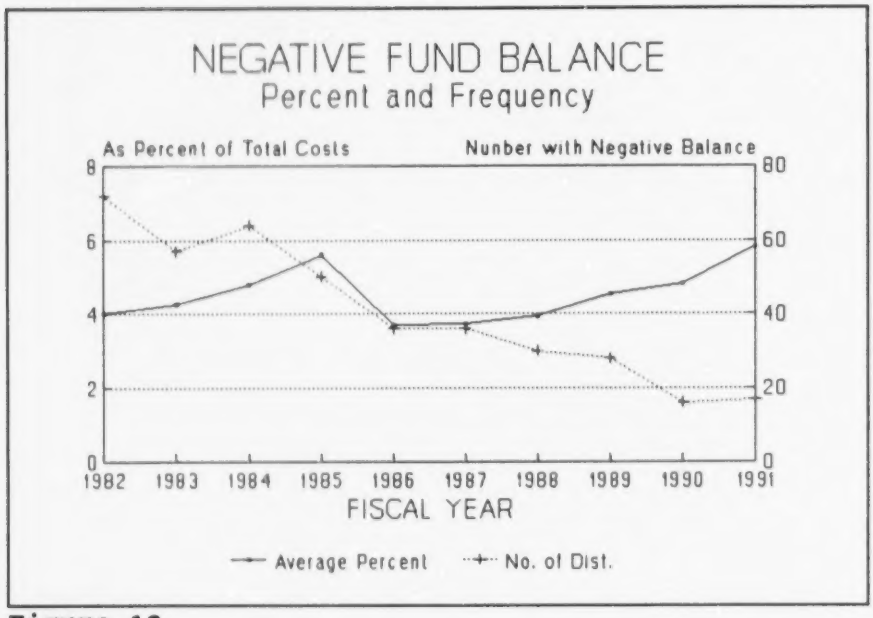

Figure 18

distress. Figure 18 shows the longitudinal trend that is associated with negative beginning fund balances (as a percent of total expenditures). The left vertical axis indicates the average deficit, as a percent of total expenditures for districts with negative beginning fund balances. The right vertical axis signifies the frequency of negative balances. The dashed trend line reflects a decrease in the number of districts with a negative beginning fund balance between the years 1982 to 1991. The number of districts with a negative beginning fund balance dropped from 70 districts in 1982 to below 20 districts in 1991. The second trend line shows the average percent of negative fund balance (as a percent of total expenditures) for the school districts in Pennsylvania with a negative balance for that year. The graph shows that the average percent of deficit between the years of 1982 to 1985 varied between 4 and 5.8 percent. Therefore, although the number of districts with negative fund balances

declined during this time period, the average size of those negative balances varied only slightly.

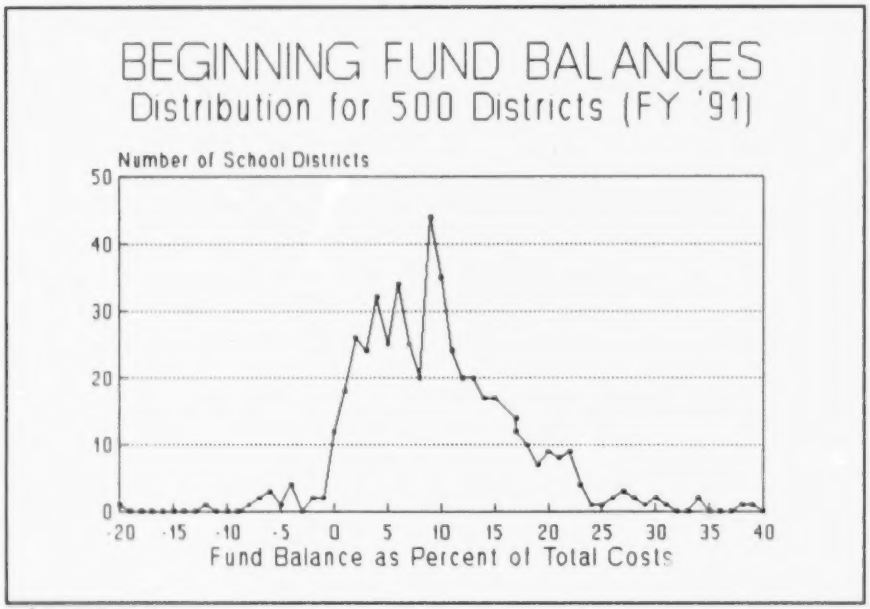

Figure 19

Figure 19 represents the beginning fund balance distribution for all 500 districts for FY '91. For example, the seventeen districts that had negative fund balances for the 1991 fiscal year (those in Figure 18) are shown in the tail of the distribution to the left of zero. Forty-four districts had a fund balance that was 9% of total expenditures, the most frequent percentage. The distribution also shows that there were sixteen districts with a beginning fund balance greater than 25%.

High School Graduation Rates. Goal 2 of the national goals states that "by the year 2000, the high school graduation rate will increase to at least 90 percent." Considerable effort has been invested in trying to develop a national indicator for this goal, with the emphasis upon trying to count the number of

students dropping out of school. This has proven difficult because of the different ways in which states collect and report such dropout statistics.

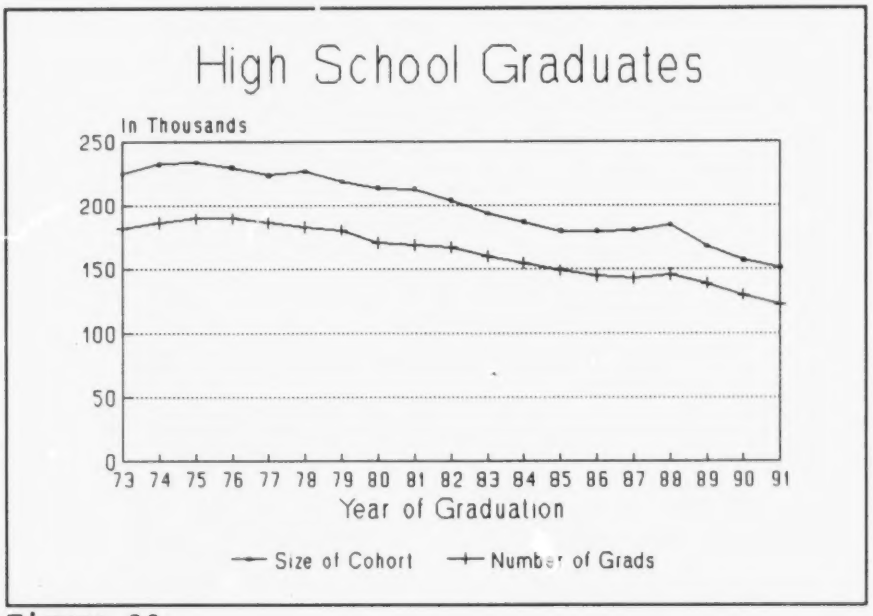

Figure 20

A more feasible way, and one that more closely reflects this goal, is to describe the percent of the grade 12 age group that is graduating from high school. For example, Figure 20 shows that the number of high school graduates (from both public and private schools) in Pennsylvania has decreased from about 190,000 in 1975 (the year of the largest "crop") to about 123,000 in 1991. But Figure 20 also shows that this decrease has paralleled the decrease in the size of the number of Pennsylvania youths in that age cohort. We use the size of the 17 year old cohort from the U. S. Census for comparison purposes. This does not assume that all graduates are 17 years old, but using the size of that cohort satisfactorily estimates the number of graduates there would be if everyone graduated from high school "on time".

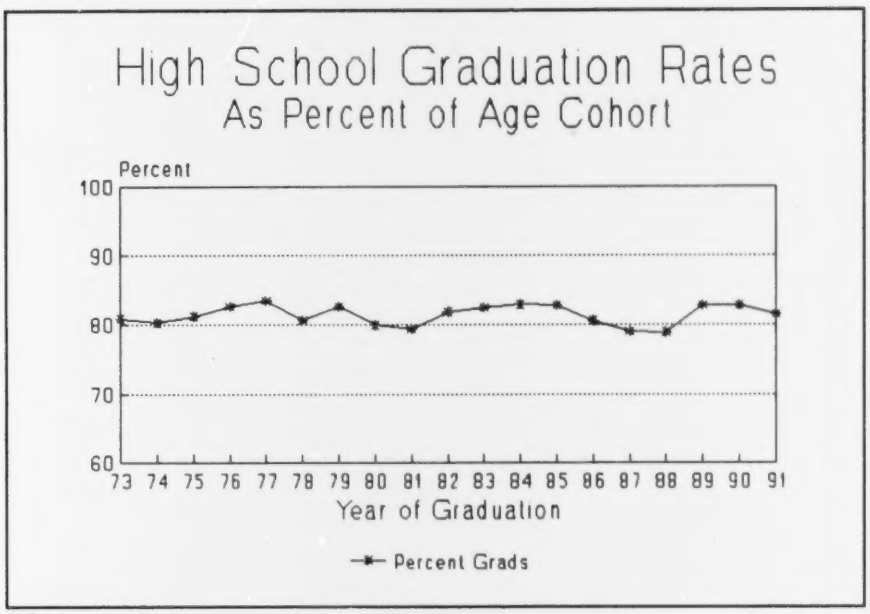

Figure 21

Figure 21 shows this longitudinal trend as a graduation rate, with a high of about 83% and a low of 79% of the age group graduating. The rather remarkable stability of this rate at around 81% (+ or - 2%) puts the national goal of 90% completion rate in perspective, and suggests that improvement in the rate may not be easy, but that the goal is at least within reach.

Figure 22 shows the distribution of this graduation rate at the county level, so that it is possible to see how this rate varies across the state. (It is not possible to do this at the district level because of the way private schools draw across districts. It is possible to obtain reasonable estimates for the 67 counties, however, using the 1990 census data for estimating the number of graduates that might be expected). In that Figure 22 it is easy to see that graduation rates are very uneven, with a few counties graduating over 95% of its 17-year olds, and five counties graduating fewer than 65%. Efforts to

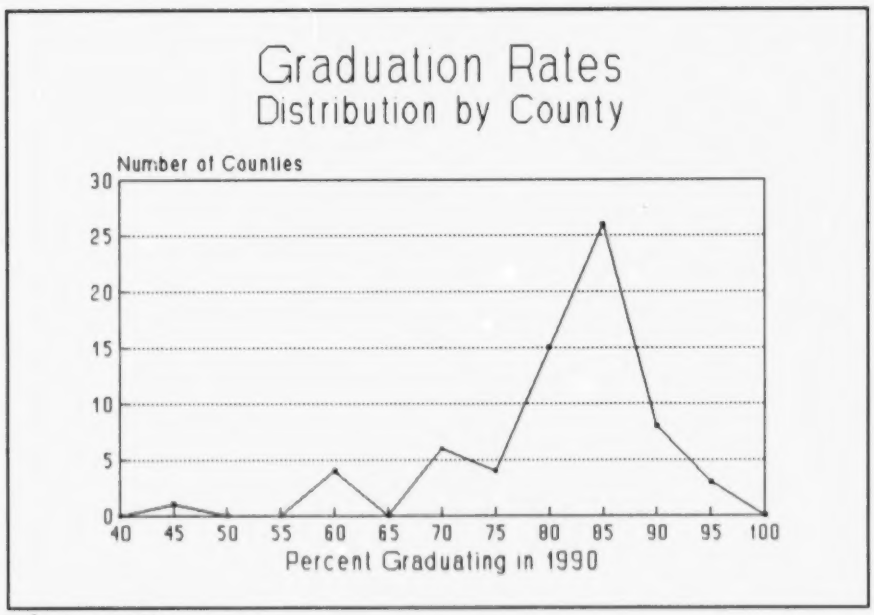

Figure 22

increase graduation rates in the state might begin by trying to understand what is happening (or is not happening) in these low rate counties.

Modeling the System of Indicators

As Odden(1990) pointed out so well, one great need in the further development of indicator systems is to better understand what the indicators indicate. The analytic work that such understanding requires has been missing in all the enthusiasm for measuring and monitoring educational reform. It also seems clear that such analytic work must be guided by explicit models of the educational system.

A simple example of such a model was reported by Cooley in PEPS Report Number 4 (1990), and is shown here in Figure 23. This model indicates that the variation in tax effort and local wealth explains the amount of revenue generated by a district. Revenues and beginning fund balance in turn explain

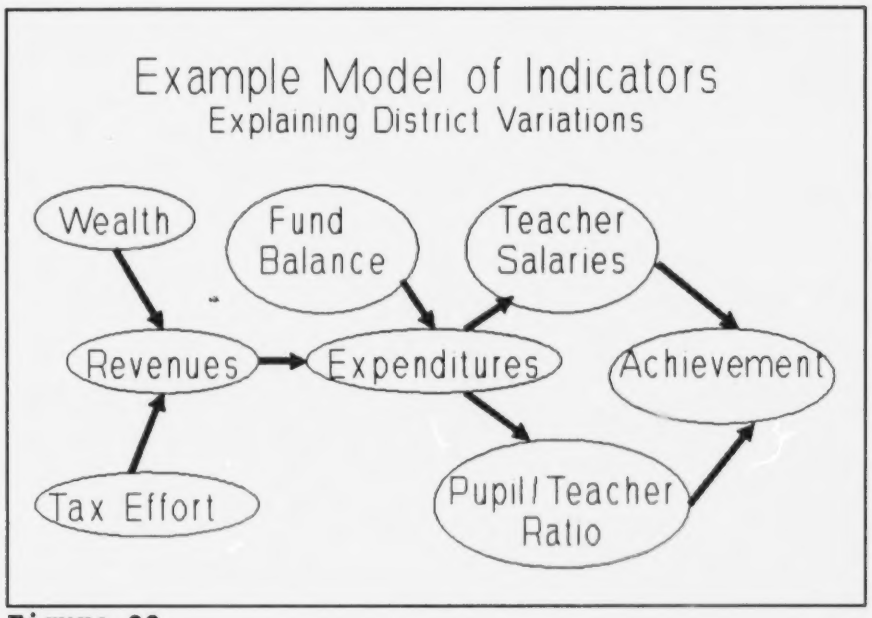

Figure 23

differences in expenditures. Higher expenditures result in higher teacher salaries or lower pupil/teacher ratios (or both). The assumption is that higher paid teachers and smaller classes produce higher student achievement. Defining and testing more complex and refined models, and the assumptions they make, will be part of the PEPS indicator work. Figure 23 simply illustrates what is meant by modelling the indicators as a guide to the study of their interrelationships.

Using the Indicators

One obvious way in which these indicators can be useful is in better understanding the current state of the state's educational system and how the educational system as a whole is changing over time. This could be important for strategic planning purposes, both at the state level and at the district level. A system of indicators that includes current goals, such as the national goal of

increasing graduation rates, makes it possible to notice whether progress is being made toward those goals.

Another use of this system of indicators is in educating the public about the wide diversity that exists among the 500 school districts in Pennsylvania. In addition to the obvious link which such diversity has to important equity issues, the district distributions help to show that across the state there are some very good things happening and some very undesirable things happening. Critics who claim "all is bad, we have to start over," are wrong. But so are those who claim that "this is the best of all possible educational systems." A system of indicators allows us to see just where the most serious problems exist, so that it is possible to focus the finite corrective energies that are available for improving conditions.

The district distributions make it possible to identify the districts that are the "worst cases" on the various indicators. Using data available within each district it is also possible to examine longitudinal trends within a district to see what has been happening over time in that district. Being an outlier on the most recent distribution might have been a fluke, an explainable aberration that does not reveal a fundamental problem in that district, so that too has to be checked. On the other hand, if a clear undesirable trend is revealed within a district, that can be the basis for the district to develop an action plan for dealing with the problem. This could be built into the strategic plan that districts are now obligated to develop every three years.

What we have tried to do in this first report of our indicator work is to identify some indicators that would illustrate the potential for a system of

educational indicators for Pennsylvania. We look forward to hearing from you as we proceed with identifying additional indicators, and as we seek to understand what valid inferences can be made from these indicators. With your help we believe that we can provide a useful service to public education in our state.

Indicator Bibliography

Berliner, D. C. (1992, February). Educational reform in an era of disinformation. Paper presented at the meetings of the American Association of Colleges for Teacher Education, San Antonio, TX.

Darling-Hammond, L. (1992, Sept.). Educational indicators and enlightened policy. Educational Policy, 6(3), 234-265.

David, J. L. (1988, March). The use of indicators by school districts: Aid or threat to improvement? Phi Delta Kappan, 499-503.

Fuhrman, S. (1988, March). An overview. Phi Delta Kappan, 486-487.

Harrison, R. S. (1976). Equality in public school finance. Lexington, MA: D.C. Heath and Company.

Jaeger, R. M. (1978). About educational indicators: Statistics on the conditions and trends in education. In L. S. Shulman (Ed.), Review of Research in Education. Itasca, IL: F.E. Peacock Publishers, Inc.

Kaagan, S. S., & Coley, R. J. (1989). State education indicators: Measured strides missing steps. New Brunswick, NJ: Center for Policy Research in Education (CPRE) & Educational Testing Service (ETS).

Kozol, J. (1991). Savage inequalities. NY: Crown.

MacRae, D., Jr. (1985). Policy indicators. NC: University of North Carolina Press.

Murnane R. J., & Pauly, E. W. (1988, March). Lessons from comparing educational and economic Indicators. Phi Delta Kappan, 509-513.

Murnane R. J., & Raizen S. (Eds). (1988). Improving indicators of the quality of science and mathematics education in grades K-12. Washington, D.C.: National Academy Press.

National Center for Education Statistics. (1991, September). Education counts: An indicator system to monitor the nation's educational health. Washington, D.C.: U. S. Government Printing Office.

Oakes, J. (1986, October). Educational indicators: A guide for policymakers. Santa Monica, CA: Rand Corporation.

Odden, A. (1990, June-July). Educational indicators in the United States: The need for analysis. Educational Researcher, 24-29.

Porter, A. (1988, March). Indicators: Objective data or political tool? Phi Delta Kappan, 503-508.

Porter, A. C. (1991, Spring). Creating a system of school process indicators. Educational Evaluation and Policy Analysis. 13,(1), 13-29.

Richards C. E. (1988, March). Indicators and three types of educational systems: Implications for design. Phi Delta Kappan, 495-499.

Selden R. W. (1988, March). Missing data: A progress report from the states. Phi Delta Kappan, 492-494.

Shavelson, R. J., McDonnell, L. M., & Oakes J. (Eds.). (1989, July). Indicators for monitoring mathematics and science education: A sourcebook. Santa Monica, CA: Rand Corporation.

Smith, M. S. (1988, March). Educational indicators. Phi Delta Kappan, 487-491.

Windham D. M. (1988, January). Indicators of educational effectiveness and efficiency. Tallahassee, FL: Educational Efficiency Clearinghouse.